



# USBattery

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## TOOLS:

- [Clamp \(more than one\)](#)
- [Computer \(1\)](#)
- [Countersink \(1\)](#)  
*or drill with 12mm bit*
- [Craft knife \(1\)](#)
- [Gloves \(1\)](#)
- [Goggles \(1\)](#)
- [Junior hacksaw \(1\)](#)
- [Metal file \(1\)](#)
- [Printer \(1\)](#)
- [Sandpaper \(1\)](#)
- [Screwdriver \(1\)](#)  
*or probe set*
- [Soldering iron \(1\)](#)
- [Steel wool \(1\)](#)



## PARTS:

- [Alkaline battery \(1\)](#)
- [USB flash drive \(1\)](#)  
*the smaller and thinner, the better. I used a Kingston DataTraveler 1GB.*
- [Sticker film \(1\)](#)  
*or sticker paper*
- [USB Mini B socket \(1\)](#)  
*desoldered from an old camera or USB hub*
- [Wire \(1\)](#)  
*from an old network cable*
- [Rare earth magnets \(2\)](#)
- [Epoxy \(1\)](#)
- [Button cell battery \(1\)](#)
- [USB A to USB Mini B cable \(1\)](#)

## SUMMARY

Keeping secret documents out of enemy hands can be a challenge, especially if the bad

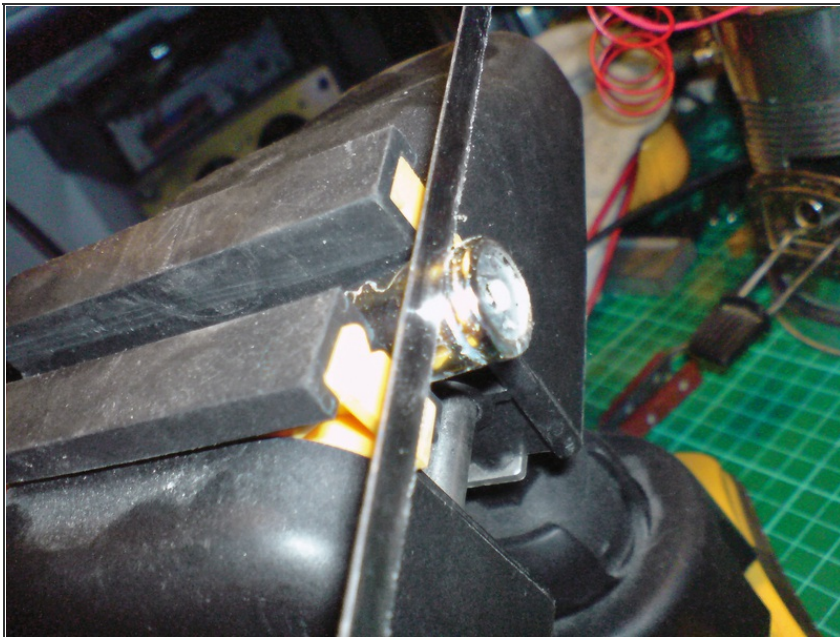
guys are in the habit of stopping and searching you. Encryption is one thing, but it's the art of steganography (hiding messages) that will ultimately save you from a small, hot room with no windows.


This project shows you how to make a USB flash memory battery useful for storing secrets far from prying eyes. The battery can store a gigabyte of data, looks just like a normal AA alkaline cell, and shows 1.5V if you test it. It'll even power small electronic devices.

### Step 1 — Remove the AA battery's plastic sheath.

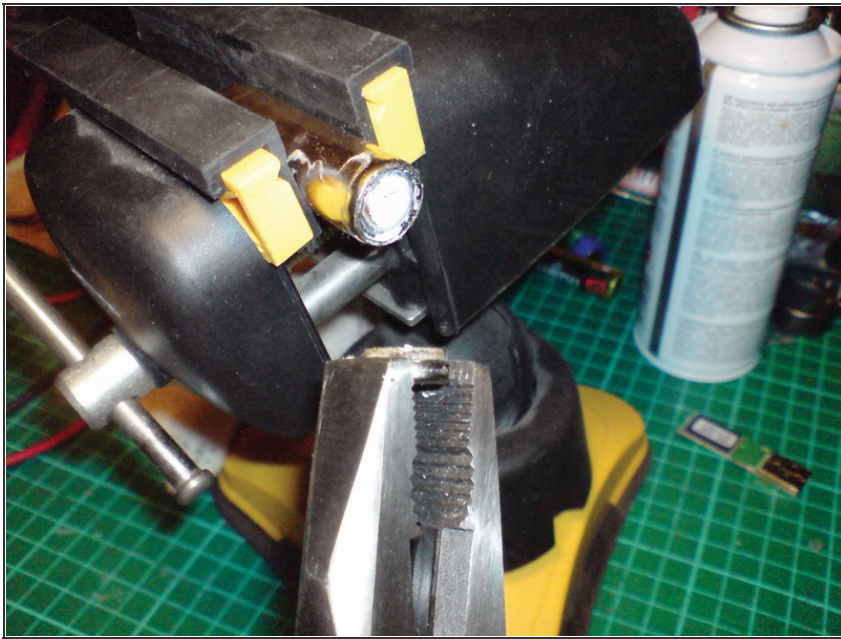
- Cut off the plastic wrapper that covers the dead AA battery, taking care not to score the metal underneath. Depending on the brand, you might need to clean glue from the battery case using a label remover.

### Step 2 — Score the battery around the bottom end cap.



- Some batteries (Duracell, for example) have a small indent in the case near the negative terminal; make cuts here with your hacksaw. Don't cut through the battery with a single cut. Just pierce the outer case, then rotate the battery, making a series of small cuts.
- CAUTION : Wear gloves and goggles when cutting and emptying the AA alkaline battery. 


### Step 3 — Empty the battery.



- Remove the end cap of the battery, using pliers if necessary, and save it for later. The inside is filled with chemical mush. Scoop this out and dispose of it safely. Wash the battery in cold water to get rid of any remaining mush.

## Step 4 — Remove the carbon lining.



- Hold the battery in a cloth and use either a drill or a countersink to carefully and slowly grind out the carbon. A 12mm bit should fit inside the battery quite neatly. Stop every now and again to empty the carbon dust out of the battery casing.
- CAUTION : If you drill too fast, the casing will get too hot to hold, or the drill will clog with dust and snatch the casing from your hand. 
- When the casing is empty, wash it again and clean it with a piece of cloth on a screwdriver. Carbon dust is electrically conductive, so you don't want to leave any in there to short out the USB circuitry.



## Step 5 — Crack open your flash drive.

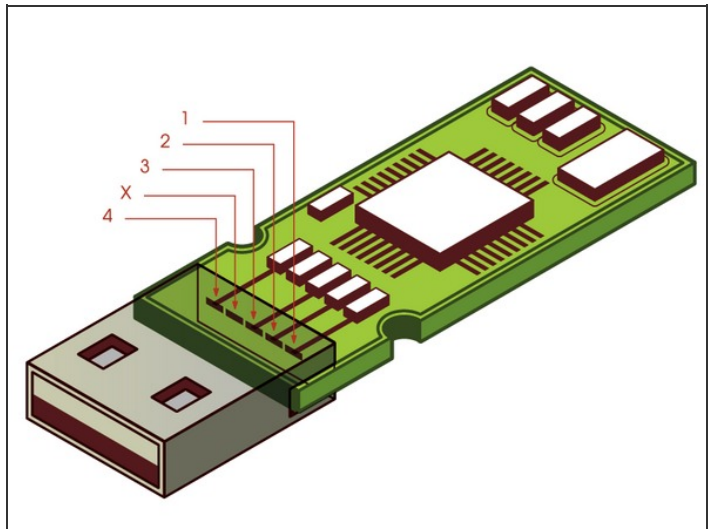


- The plastic case on most USB thumb drives is clipped together and can be opened fairly easily by levering around the seams with a knife.
- The space inside the battery is tight, so you may need to file the edges of the USB circuit board and gently flex the metal casing to get it to fit. Just be careful not to knock any components off. Also look out for any “through-the-board” links, and make sure that you don’t grind them away.

## Step 6 — Remove the USB plug from the flash drive.

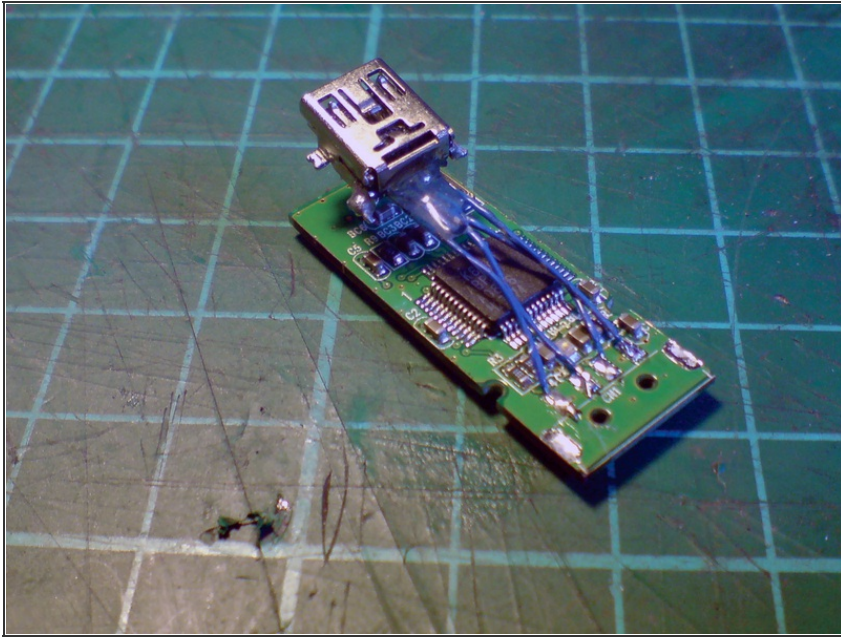
- The standard USB plug is too large to fit inside the battery, so it needs to be removed with a soldering iron or a micro heat gun. Heat the solder as evenly as possible, without melting any of the surface-mount components. Don’t pull the socket; applying too much pressure will break the fine metal tracks on the circuit board.


## Step 7 — Wire the tags on the mini USB socket.



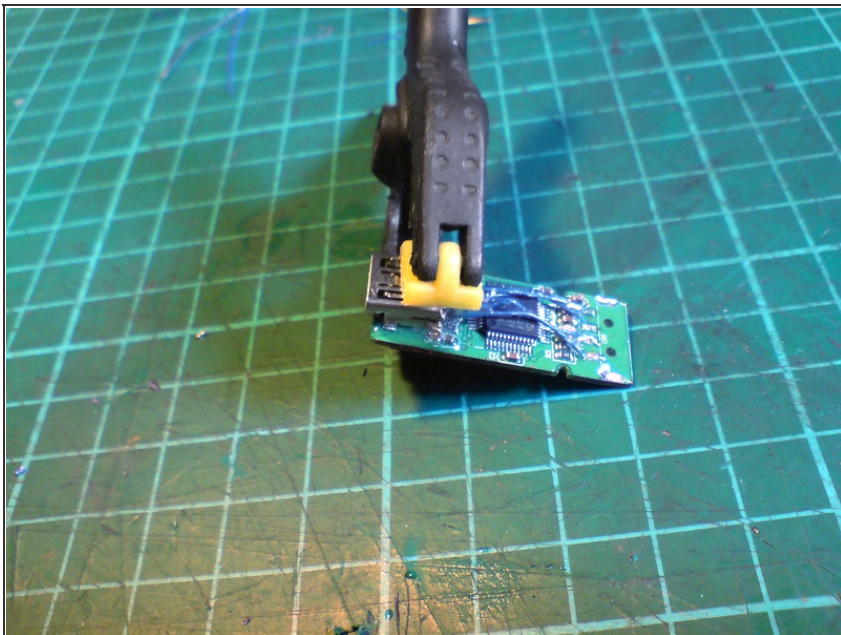
- The wires should be connected as shown in the diagram. This will take a steady hand and plenty of patience. If you have a magnifying light, you might want to use it. Begin by applying solder to the wire and the socket individually, then put them together and touch them with the iron to briefly remelt the solder. Holding the iron on for too long will melt the socket. Once the wires are soldered in place, strengthen the joint by applying a little epoxy resin to the back of the socket.

## Step 8 — Connect and test the mini socket.



- Trim the mini socket's wires so that they reach the tags that the original USB plug was connected to. Solder them into place, but don't overheat them.
- **CAUTION** : Make sure you've wired the socket correctly. It's possible to permanently damage your computer if you don't. 
- Plug the USB drive into the computer to check that it's working. If it is, then carry on making; otherwise go back and check your wiring. The circuit must work before you can continue.

## Step 9 — Glue the socket and wires in place.



- Use more epoxy, holding the socket in place with a small clamp if necessary. When the glue is dry, remove the clamp and slide the circuit into the battery housing, with the socket pointing out.



**Step 10 — Install 2 small magnets in the case.**

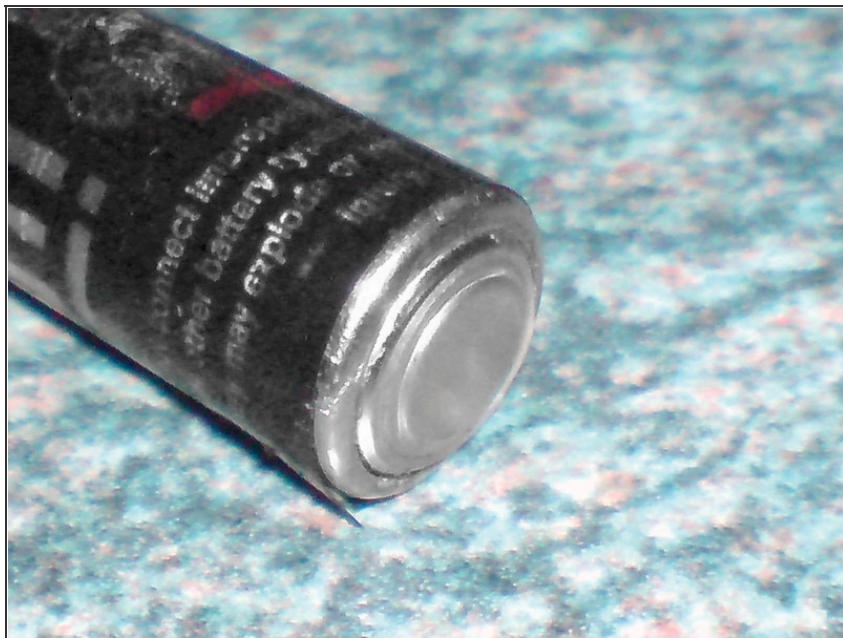
- Set these back slightly from the edge of the case, but don't block the USB socket. Make sure the poles of the magnets are both facing the same way relative to the battery case.
- Apply a little more epoxy and hold the magnets in place with small clamps or tweezers until the glue dries.


**Step 11 — Salvage the ring from the end cap of the AA.**

- You'll probably find a plastic plug with a thin metal cap stuck inside the end cap you removed from the AA battery. You need to remove this plastic. Pick it away with pliers, blades, or a drill.
- Once you've liberated the small metal ring from the plastic plug, clean the ring with steel wool.



## Step 12 — Install the AG13 battery button.



- Melt some solder onto the inside of the ring from the AA, and then scuff the outside of the AG13 battery with fine sandpaper.
- CAUTION : Don't use steel wool to scuff the AG13 battery, as it will short-circuit the cell. 
- Place the AG13 on a heat-resistant surface with its negative terminal facing up. Center the ring on the AG13 so that its negative terminal is positioned where the AA's negative terminal used to be. Melt the solder on the ring again to join them. If you can't get the solder to stick properly, use some spots of epoxy to reinforce the weld.
- Now the end cap should fit back onto the end of the battery case, and be held in place by the magnets you glued in earlier.

### Step 13 — Create the new wrapper for the battery.



- A suitable piece of artwork can be downloaded from the Files section above and printed onto sticky-backed inkjet paper or film. Before you stick it on, use a cotton swab and solvent to remove the adhesive from the bottom ½" of the label. This makes it easy to remove the bottom of the battery without it sticking to the artwork.
- The battery should now look like an ordinary AA battery, and also register a normal 1.5V voltage if you check it with a voltmeter, thanks to the AG13 cell fitted to the end cap.
- To remove the end of the battery and reveal the USB socket, simply attach a small magnet to the bottom of the battery and pull it away from the rest of the battery.
- You now have your very own secret USB drive that you can use to smuggle those all-important Death Star plans past those pesky Imperial stormtroopers. To make it really blend in, you should cover some other normal batteries with artwork that matches the USB battery.

This project first appeared in [MAKE Volume 16](#), page 80.

This document was last generated on 2012-10-31 03:03:19 PM.